



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/658,932

09/09/2003

David N. Ku

9537-3

3113

20792 7590 04/13/2009
MYERS BIGEL SIBLEY & SAJOVEC
PO BOX 37428
RALEIGH, NC 27627

EXAMINER

WILLSE, DAVID H

ART UNIT

PAPER NUMBER

3738

MAIL DATE

DELIVERY MODE

04/13/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Art Unit: 3738

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9, 14-25, 28, 29, 34-45, 47-52, 56-69, and 71-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruberti et al., US 2004/0092653 A1, which discloses a spinal intervertebral disc (paragraph **0027**; etc.) being a single non-articulation body of a single solid biocompatible elastomer of PVA cryogel cross-linked by freeze-thaw processing (paragraph **0078**; etc.). The single body defines an exposed surface that is modified to provide specific surface characteristics (paragraph **0030**; etc.). The language added to instant claim 1 and others constitutes a product-by-process limitation and does not appear to distinguish the *product* of the claimed invention over the preferred embodiment of Ruberti et al., because freeze-thaw processing alone and the combined processing steps favored by Ruberti et al. all result in “physical” crosslinking, as described in paragraphs **0086** and **0104**, for example (MPEP § 2113). Moreover, that Ruberti et al. teach an advantageous PVA hydrogel which is both a thetagel and a cryogel (e.g., paragraph **0014**) does not imply that cryogels alone are unobvious from the Ruberti

Art Unit: 3738

et al. disclosure. In fact, Ruberti et al. are clearly open to PVA hydrogels being formed by freeze-thaw processing only, because nanostructuring, for instance, is not limited to thetagels (paragraph **0134**) and because freeze-thaw cycling alone is compatible with incorporated molecules that can tolerate such cycles (paragraph **0085**, which, like the Applicant's specification, incorporates US 6,231,605 B1 by reference). Therefore, the physical cross-linking only by freeze-thaw processing would have been an inherent variation, even though such was not the most preferred method, and would also have been obvious in order to simplify manufacturing of the prosthesis.

Ruberti et al. teach that "[t]he nucleus pulposus is always in compression, while the annulusfibrosis is always in tension" (paragraph **0003**) in the natural intervertebral disk, and that "the one-piece prosthetic intervertebral disk approximates the spatial distribution of the mechanical properties of the combination of the nucleus pulposus and the annulus fibrosis of the natural intervertebral disk" (paragraphs **0027**; **0034**; **0063**; **0077**; **0087**; etc.). Because "[t]he loads that any vertebral implant must withstand will be reasonably high (on the order of 4MPa in compression)", and the compressive load is transferred "to a tensile circumferential load in the annulus fibrosis" (paragraph **0077**), an ultimate strength in tension greater than about 100 kPa would have been immediately obvious, if not inherent, to the ordinary practitioner. Likewise, since rotations of $\pm 5^\circ$ are achieved in a natural disk (paragraph **0007**), the prosthesis having adequate viscoelastic properties (paragraph **0011**; etc.) to permit 10° of overall rotation would likewise have been obvious, if not inherent. Regarding claim 4 and others: paragraphs **0067**; **0075**; etc. Regarding claim 15 and others, the use of fabric, mesh, or the like to anchor a disk implant to adjacent vertebrae via screws and bone ingrowth (into the fabric or mesh) was well

Art Unit: 3738

known in the art at the time of the present invention and would have been obvious in order to stabilize the device relative to the spine.

Response to Applicant's Remarks

The Applicant appears to suggest that Ruberti et al. teach away from physical crosslinking (Applicant's reply of December 3, 2008: paragraph bridging pages 13 and 14; page 14, first and second paragraphs; etc.). The examiner disagrees: the Ruberti et al. disclosure teaches away from chemical crosslinking (e.g., paragraphs **0069** and **0072**) and instead favors an improved method (e.g., paragraph **0073**) involving *physical* crosslinking (paragraphs **0013**, **0038**, **0083**, **0104**, **0141**, etc.). The Applicant argues that claims 5, 40, and 74 are independently patentable over the cited art (Applicant's reply of December 3, 2008: page 15, first paragraph), but even Ruberti et al. embodiments characterized by anisotropic mechanical properties have smooth gradients (paragraphs **0075** and **0117**) and thus do not possess a distinct boundary between a core region and an annulus region.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dave Willse, whose telephone number is 571-272-4762 and who is generally available Monday, Tuesday, and Thursday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Corrine McDermott, can be reached on 571-272-4754. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

**/David H. Willse/
Primary Examiner
Art Unit 3738**